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FIFTEENTH ANNUAL REPORT

YELLOWSTONE RIVER COMPACT COMMISSION

1966

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FIFTEENTH ANNUAL REPORT

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YELLOWSTONE RIVER COMPACT COMMISSION

408 Federal Building
Helena, Montana

December, 1966

Honorable Clifford P. Hansen
Governor of the State of Wyoming
Cheyenne, Wyoming

Honorable Tim M. Babcock
Governor of the State of Montana
Helena, Montana

Honorable William L. Guy
Governor of the State of North Dakota
Bismarck, North Dakota

Sirs:

Pursuant to Article III of the Yellowstone River Compact, the Commission makes the following fifteenth annual report of activities for the period ending September 30, 1966.

The fifteenth annual meeting of the Commission was held at Billings, Montana in the new Federal Building on November 22, 1966. Mr. F. A. Bishop, Wyoming State Engineer and Mr. Alex D. McDermott, Director of the Montana State Water Conservation Board, the designated representatives of their respective states, were present. Mr. Harlan M. Erskine, designated Federal representative, served as chairman and secretary. Others present were: John S. Bereman, Interstate Stream Engineer, Wyoming; Thomas E. Cahill, Attorney General's Office, Wyoming; Everett V. Darlinton, State Water Conservation Board, Montana; and Charles W. Lane, George M. Pike and Charles H. Carstens, U. S. Geological Survey, Montana District.

During the water year ending September 30, 1966, annual streamflow at the designated points of measurement in Montana ranged from 42 to 78 percent of the 1945-60 averages. Despite the relatively low runoff, irrigation needs were supplied satisfactorily except for small localized areas of shortage in Wyoming. Storage in major reservoirs decreased appreciably during the year and on September 30, 1966 it ranged from 27 to 74 percent of the contents one year earlier.

There were no developments during the year which required allocations of water in accordance with the provisions of the Compact. The State Commissioners are of the opinion that the present water resources development does not warrant verification or study of allocable use.

Industrial developments requiring substantial quantities of water are under consideration along the Tongue River in Montana. A study of the water rights and usage

in this basin in both states will be necessary to determine the water that may be available for the proposed developments.

The expense of the Commission during the fiscal year ending June 30, 1965 was $9,000, and a like amount is being budgeted to cover anticipated costs during the current fiscal year.

Respectfully submitted,

Floyd A. Bishop
Commissioner for Wyoming

Alex D. McDermott
Commissioner for Montana

Harlan M. Erskine
Federal Representative

GENERAL REPORT

Cost:

The work of the Commission, which to date has been primarily concerned with the collection of required hydrologic data, has been financed through cooperative arrangements whereby Montana and Wyoming each bear one-fourth of the cost and the remaining one-half is borne by the United States. The salaries and necessary expenses of the State representatives and hydrologic data made available by other agencies is not evaluated or considered as expense of the Commission.

The expense of the Commission during the fiscal year ending June 30, 1966 was $9,000 in accordance with the budget adopted for that year.

The budget for fiscal year ending June 30, 1967 was initially arranged by earlier negotiation between the cooperating agencies and verified at the annual meeting. It is summarized as follows:

Gaging station operation and supplementary periodic measurements of discharge at auxiliary points	$8,000
Data assembly, report preparation and secretarial functions	1,000
Total	$9,000

Gaging stations:

The collection of discharge records at sites specified in the Rules and Regulations, or at a substitute site for the Clarks Fork of the Yellowstone River, was continued. The Clarks Fork of the Yellowstone River records are being collected at a gaging station at Edgar, about four miles upstream from the Whitehorse Canal diversion and six miles upstream from the mouth of Rock Creek. During the diversion season, periodic supplementary measurements were made of the flow in Whitehorse Canal and the Clarks Fork a short distance upstream from Rock Creek to establish flow relationships. The results were inconclusive. Investigations are in progress to determine the practicability of establishing a gaging station on the Clarks Fork a short distance upstream from Rock Creek. The gaging system presently in use will be continued until a more suitable arrangement can be developed.

Streamflow at all the designated points of measurement was appreciably below that of 1965 and ranged from 42 to 78 percent of the 1945-60 average; however, it was well above the near-record low flows recorded during 1961.

Details of streamflow and bar-graph comparisons with average flows during the periods are given in Appendix B.

Diversions:

Opinions expressed by the two State representatives indicated that allocable

diversions in Montana and Wyoming initiated since January 1, 1950 did not warrant detailed consideration and that use in the upstream State did not exceed Compact allowances.

A Montana report containing a compilation of water-right filings in the basins of the four designated interstate tributary streams in Montana for the period January 1, 1950 to October 31, 1966, and a summary of those existing prior to and excluded from Yellowstone River Compact allocations was presented by Mr. McDermott. He reported that his agency had recently revised the water Resources Survey of Carbon County, Montana and a report having this title has been released.

Mr. McDermott reported that industrial developments requiring substantial quantities of water, are under consideration on the Tongue River in Montana. A determination of the quantity of water that can be made available for these developments is necessary. Mr. Bishop was of the opinion that the water-right filings would be a reasonably accurate indication of usage in Wyoming. He will prepare a summary of the filings from January 1, 1950 to date for use in making hydrologic analyses to determine the quantity of water available for use in Montana.

Storage:

In reservoirs completed after January 1, 1950

Yellowtail Dam and reservoir on the Bighorn River in Montana were completed by the Bureau of Reclamation during the year. Storage in the reservoir which has a usable capacity of 1,356,000 acre-feet began in November, 1965 and was 601,700 acre-feet as of September 30, 1966. Details regarding this reservoir are given in Appendix C.

Boysen Reservoir on the Wind River, operated by the Bureau of Reclamation, was virtually full with usable contents of 727,500 acre-feet at the beginning of the water year. Its contents had diminished to 524,900 acre-feet on September 30, 1966. No water was impounded in Anchor Reservoir at the close of the year. Data for these reservoirs are given in Appendix C.

The Commission is cognizant of other reservoirs in this general group and considers their aggregate effect to be insufficient to warrant the collection of storage data at this time.

In reservoirs existing on January 1, 1950

Storage pertinent to Compact allocation in these reservoirs is confined to usage for new developments completed after January 1, 1950. This is currently considered to be very minor. Month-end storage data for these reservoirs is given in Appendix D as a matter of record and general information on water supply.

RULES AND REGULATIONS FOR ADMINISTRATION OF THE YELLOWSTONE RIVER COMPACT

A compact, known as the Yellowstone River Compact between the States of Wyoming, Montana and North Dakota, having become effective on October 30, 1951 upon approval of the Congress of the United States, which apportions the waters of certain interstate tributaries of the Yellowstone River which are available after the appropriative rights existing in the States of Wyoming and Montana on January 1, 1950 are supplied, and after appropriative rights to the use of necessary supplemental water are also supplied as specified in the Compact, the following rules and regulations are adopted subject to the provisions for amendment, revision or abrogation as provided herein.

Article I. Collection of Water Records.

A. It shall be the joint and equal responsibility of the members of the states of Wyoming and Montana to collect, cause to be collected or otherwise furnish records of tributary stream flow at the points of measurement specified in Article V (B) of the Compact, or as near thereto as is physically or economically feasible or justified.

1. Clarks Fork

The gaging station known as Clarks Fork at Edgar, Montana and which is located in SW 1/4, sec. 24, T.4 S., R.24 E., shall temporarily be the point of measurement for the Clarks Fork, subject to whatever mutually agreeable corrections to the streamflow records at this point as may be deemed practical to meet the terms of the Compact.

2. Bighorn River (exclusive of Little Bighorn River)

The gaging station known as the Bighorn River near Custer, Montana and located near the center of sec. 10, T.4 N., R.34 E., shall temporarily be the designated point of measurement on that stream. The flow of the Little Bighorn River as measured at the gaging station near Hardin, Montana and located in S 1/2, SE 1/4 sec. 18, T.1 S., R.34 E., shall be considered the point of measurement for that stream, except that if or when satisfactory records are not available, the records for the nearest upstream station with practical corrections for intervening inflow or diversion shall be used.

3. Tongue River

The gaging station known as the Tongue River at Miles City, Montana and located in SE 1/4, sec. 23, T.7 N., R.47 E., shall temporarily be the point of measurement for that stream.

4. Powder River

The gaging station known as the Powder River near Locate, Montana and located in NE 1/4, sec. 26, T.8 N., R.51 E., shall temporarily be the designated point of measurement for that stream.

B. Records of total annual diversion in acre-feet above the points of measurement designated in the Compact for irrigation, municipal and industrial uses developed after January 1, 1950 shall be furnished by the members of the Commission for their respective states, at such time as the Commission deems necessary for interstate administration as provided by the terms of the Compact. Providing that if it be acceptable to the Commission, reasonable estimates thereof may be substituted.

C. Annual records of the net change in storage in all reservoirs, not excluded under Article V (E) of the Compact, above the specified point of measurement specified in the Compact and completed after January 1, 1950, and the annual net change in reservoirs existing prior to January 1, 1950, which is used for irrigation, municipal and industrial purposes developed after January 1, 1950, shall be the primary responsibility of the member of the Commission in whose state such works are located; providing, such data is not furnished by federal agencies under the provisions of Article III (D) of the Compact, or, collected by the Commission.

Article II. Office and Officers.

A. The office of the Commission shall be located, and be that of the United States Geological Survey in Helena, Montana.

B. The Chairman of the Commission shall be the federal representative as provided in the Compact.

C. The Secretary of the Commission shall be as provided for in Article III of these rules.

D. The credentials of each member of the Commission shall be placed on file in the office of the Commission.

Article III. Secretary

A. The Commission, subject to the approval of the Director of the United States Geological Survey, shall enter into cooperative agreements with the U. S. Geological Survey for such engineering and clerical services as may reasonably be necessary for the administration of the Compact. Said agreements shall provide that the Geological Survey shall:

1. Maintain and operate gaging stations at or near the points of measurement specified in Article V (A) of the Compact.

2. Assemble factual information on stream flow, diversion and reservoir storage for the preparation of an annual report to the Governors of the signatory states.

3. Make such investigations and reports as may be requested by the Commission in aid of its administration of the Compact.

B. Act as Secretary to the Commission.

Article IV. Budget

A. At the annual meeting of each even numbered year or prior thereto, the Commission shall adopt a budget for operation during the ensuing biennium beginning July first. Such budget shall set forth the total cost of construction, maintenance and operation of gaging stations, the cost of engineering and clerical aid, and other necessary expenses excepting the salaries and personal expenses of the Commissioners. On odd-numbered years revisions of the budget shall be considered.

B. It shall be the obligation of the Commissioners of the States of Montana and Wyoming to endeavor to secure from the Legislature of their respective states sufficient funds with which to meet the obligations of this Compact, except insofar as provided by the federal government.

Article V. Meetings

An annual meeting of the Commission shall be held on the third Tuesday of each November at some mutually agreeable point in the Yellowstone River Basin for consideration of the annual report for the water year ending the preceding September 30th, and for the transaction

of such other business consistent with its authority; provided that by unanimous consent of the Commission the date and place of the annual meeting may be changed. Other meetings as may be deemed necessary shall be held at a time and place set by mutual agreement, for the transaction of any business consistent with its authority.

No action of the Commission shall be effective until approval by the Commissioners for the States of Wyoming and Montana.

Article VI. Amendments, Revisions and Abrogations.

The Rules and Regulations of the Commission may be amended or revised by a unanimous vote at any meeting of the Commission.

Alex D. McDermott
Commissioner for Montana

Floyd A. Bishop
Commissioner for Wyoming

ATTESTED:

Frank Stermitz
Federal Representative

Adopted November 17, 1953
Amended November 16, 1959

MONTHLY SUMMARY OF DISCHARGE
Clarks Fork Yellowstone River at Edgar, Montana

Location.--Lat. 45°28'00", long. 108°50'30", in SE1/4, SE1/4, sec.23, T.4 S., R.23 E., on right bank just downstream from highway bridge, half a mile east of Edgar and 6 miles upstream from Rock Creek, and at mile 27.0.

Drainage area.--2,032 sq mi.

Records available.--July, 1921 to September, 1966. Prior to October, 1956, published as Clarks Fork at Edgar. Monthly discharge only for some periods, published in WSP 1309. Records since January, 1950 available in annual reports of Yellowstone River Compact Commission.

Gage.--Water-stage recorder. Altitude of gage is 3,440 ft (by barometer). Prior to Sept. 18, 1940, chain gage and Sept. 18, 1940, to Aug. 31, 1953, wire-weight gage, at same site and datum.

Average discharge.--45 years, 1,038 cfs (751,500 acre-ft per year).

Extremes.--Maximum discharge during year, 6,340 cfs June 23 (gage height, 6.79 ft); minimum, 188 cfs Aug. 17 (gage height, 1.40 ft).

1921-66: Maximum discharge observed, 10,900 cfs June 2, 1936 (gage height, 8.62 ft); minimum, 36 cfs Apr. 22, 1961.

Remarks.--Records good except those for periods of ice effect, which are poor. Upstream diversions for irrigation of about 41,500 acres, of which about 840 acres lie below the station. In addition, about 6,300 acres of land above station are irrigated by diversions from the adjoining Rock Creek basin. See next page for data on the flow of Whitehorse Canal and Clarks Fork Yellowstone River near mouth.

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in Acre-feet
October 1965	23,090	952	585	745	45,800
November	16,998	595	532	567	33,720
December	15,132	575	370	488	30,010
January 1966	12,080	550	260	390	23,960
February	9,460	380	280	338	18,760
March	11,592	450	250	374	22,990
April	12,589	523	360	420	24,970
May	57,584	5,290	332	1,858	114,200
June	85,950	6,070	1,520	2,865	170,500
July	35,058	2,490	374	1,131	69,540
August	12,372	692	195	399	24,540
Sept. 1966	13,060	790	225	435	25,900
Water year 1965-66	304,965	6,070	195	836	604,890

MONTHLY SUMMARY OF DISCHARGE
Clarks Fork Yellowstone River at Edgar, Montana

Supplementary Data

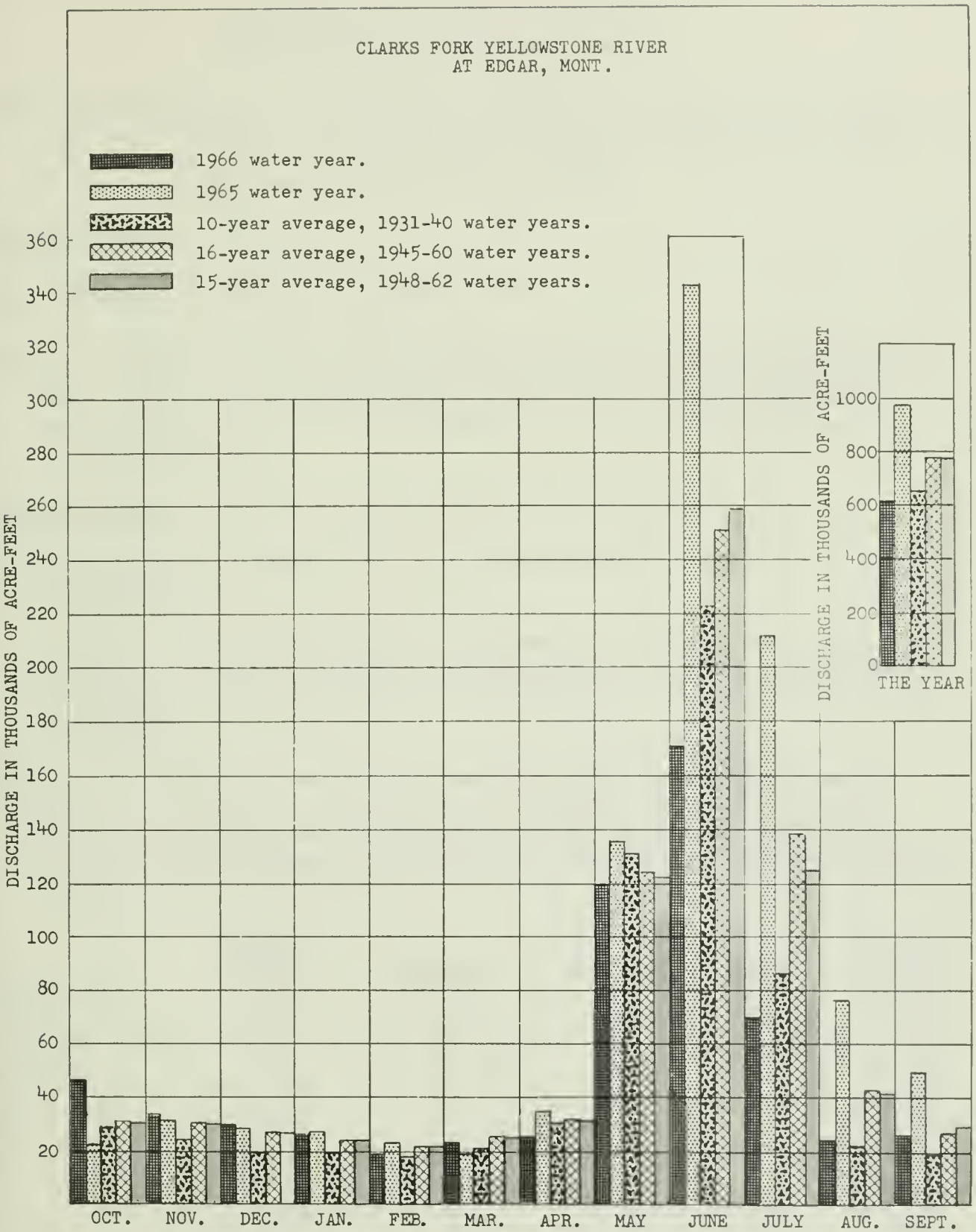
The Compact specified the official point of measurement of the Clarks Fork Yellowstone River shall be just above the mouth of Rock Creek about 6 miles downstream from the gaging station at Edgar. The known intervening diversion is the Whitehorse Canal which begins in SW 1/4, sec. 1, T.4 S., R.23 E., about 4 miles downstream from the gaging station. The canal serves about 1,000 acres. Based upon periodic discharge measurements of the diversion and information on canal operation, that seasonal diversion is estimated at about 12,000 acre-feet.

Periodic discharge measurements of the Clarks Fork Yellowstone River in SE 1/4, sec. 1, T.4 S., R.23 E., about half a mile downstream from the Whitehorse Canal diversion and the Whitehorse Canal are tabulated below. Concurrent discharge shown for the gaging station at Edgar is approximately adjusted for lag time. The indicated inflow may generally be return flow from irrigated lands served by Rock Creek water.

Discharge in cfs at selected points

Date	Clarks Fork at Edgar	Whitehorse Canal	Clarks Fork at SE 1/4, sec. 1	Apparent inflow in reach
Oct. 20, 1965	704	26.0	719	+41
Nov. 23	570	0	531	-39
Dec. 21	-	0	435	-
Jan. 18, 1966	-	0	446	-
Mar. 23	336	0	334	-2
Apr. 19	426	0	416	-10
May 13	1,870	48.0	1,720	-102
May 31	5,520*	49.9	5,240	-230
July 11	1,060	44.3	1,080	+64
Aug. 17	208	27.4	227	+46
Sept. 22	555	40.8	556	+42

* Some uncertainty as to equivalent discharge due to large diurnal fluctuation.



Comparison of discharge during 1966 water year with 1965 water year and with average discharge for water years 1931-40, 1945-60 and 1948-62.

MONTHLY SUMMARY OF DISCHARGE
Little Bighorn River near Hardin, Montana

Location.--Lat 45°44'10", long 107°33'25", in NE1/4 NE1/4, sec. 19, T.1 S., R.34 E., on left bank, 50 ft downstream from bridge on Sarpy Road, a quarter of a mile upstream from terminal wasteway of Agency Canal, half a mile upstream from mouth, and 2-1/2 miles east of Hardin.

Drainage area.--1,294 sq mi.

Records available.--June 1953 to September 1966.

Gage.--Water-stage recorder. Altitude of gage is 2,890 ft (from topographic map). Prior to Oct. 7, 1953, wire-weight gage at site 0.4 mile downstream. Oct. 7, 1953, to May 6, 1963, water-stage recorder at site 0.3 mile downstream. May 6, 1963, to Nov. 6, 1963, staff gage at site 0.4 mile downstream. All at different datums.

Average discharge.--13 years, 232 cfs (168,000 acre-ft per year).

Extremes.--Maximum discharge during year, 992 cfs May 12; minimum, 6.7 cfs Aug. 18.

1953-66: Maximum discharge, 4,520 cfs April 2, 1965; maximum gage height, 11.78 ft Mar. 20, 1960, site and datum then in use (backwater from ice); minimum discharge observed, 0.2 cfs Aug. 7, 1961, result of discharge measurement.

Remarks.--Records good except those for period of ice effect or no gage-height record, which are poor. Diversions for irrigation of about 17,000 acres above station. Flow partly regulated by Willow Creek Reservoir (capacity, 23,000 acre-ft). Figures of discharges given include flow of terminal wasteway of Agency Canal.

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in Acre-feet
October 1965	6,412	244	190	207	12,720
November	5,563	197	148	185	11,030
December	4,625	225	75	149	9,170
January 1966	3,840	190	70	124	7,620
February	4,018	160	120	144	7,970
March	7,114	377	100	229	14,110
April	8,651	400	241	288	17,160
May	15,568	912	257	502	30,880
June	6,181	513	90	206	12,260
July	1,431	96	17	462	2,840
August	715.8	61	7.4	23.1	1,420
September 1966	1,857	93	14	61.9	3,680
Water year 1965-1966	65,975.8	912	7.4	181	130,860

MONTHLY SUMMARY OF DISCHARGE
Bighorn River at Bighorn, Montana

Location.--Lat 46°08'50", long 107°28'00", in NE1/4 NE1/4, sec.33, T.5 N., R.34 E., on right bank half a mile downstream from bridge on Interstate Highway 94, three-quarters of a mile upstream from mouth, 1 mile southwest of Bighorn, and 4 miles east of Custer.

Drainage area.--22,885 sq mi. At site used prior to Oct. 7, 1955, 22,410 sq mi.

Records available.--May 1945 to September 1966. Published as "near Custer," 1945-55. Records since January 1950, available in annual reports of Yellowstone River Compact Commission.

Gage.--Water-stage recorder. Altitude of gage is 2,690 ft (by barometer). May 11 to Dec. 6, 1945, wire-weight gage and Dec. 7, 1945, to Oct. 6, 1955, water-stage recorder, at site 4 miles upstream at different datum.

Average discharge.--21 years, 3,665 cfs (2,653,000 acre-ft per year).

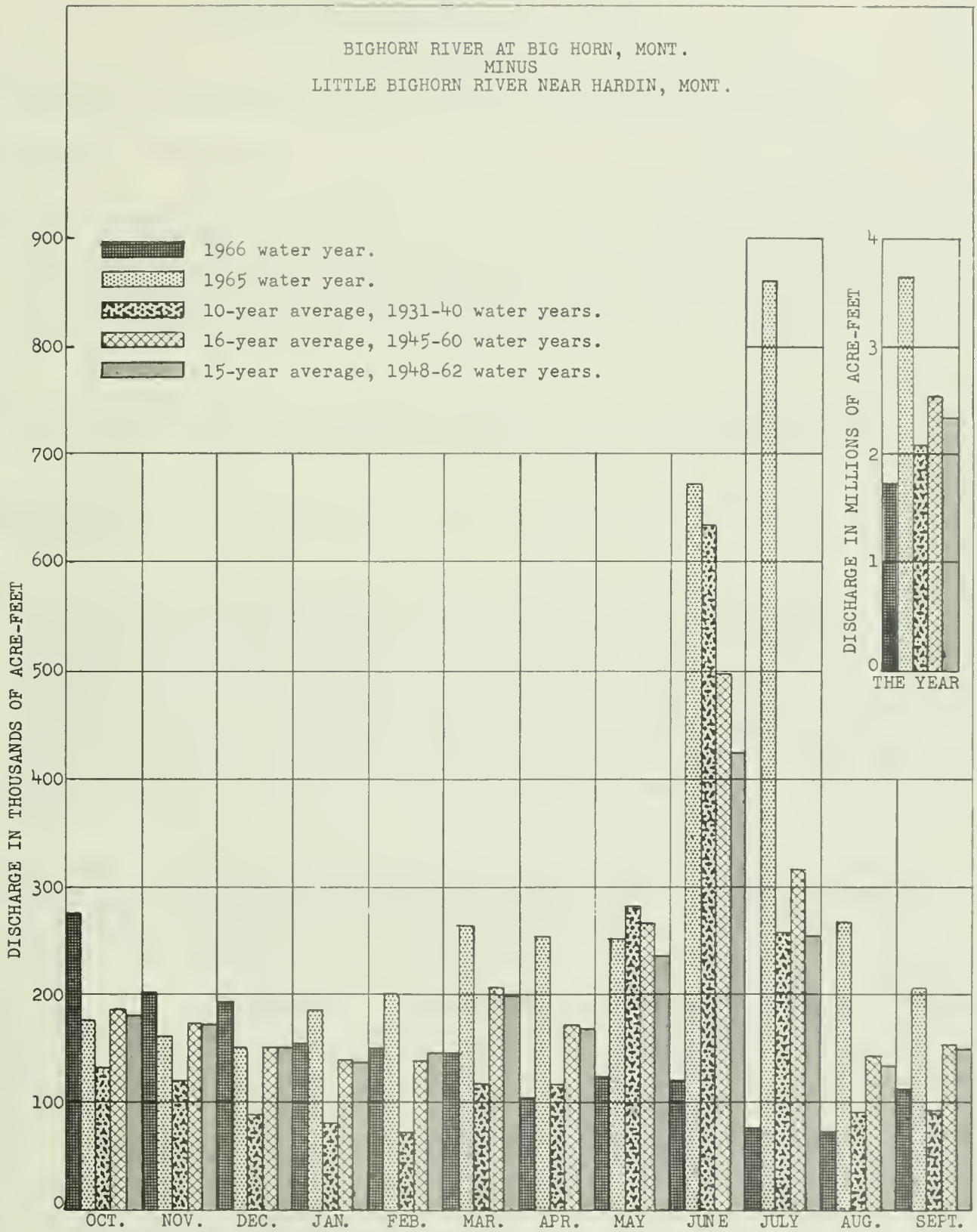
Extremes.--Maximum discharge during year, 5,020 cfs Oct. 1 (gage height, 3.62 ft); maximum gage height recorded, 10.25 ft Jan. 2 (ice jam); minimum daily discharge, 500 cfs Mar. 5; (minimum gage height, 0.68 ft, Apr. 13).

1945-66: Maximum discharge, 26,200 cfs June 24, 1947 (gage height, 8.79 ft, site and datum then in use), from rating curve extended above 12,500 cfs by logarithmic plotting; maximum gage height recorded, 14.21 ft, Apr. 2, 1965 (ice jam); minimum discharge, about 275 cfs Nov. 15, 1959, result of freezeup; minimum daily, 500 cfs Mar. 5, 1966.

Remarks.--Records good except those for winter period, which are poor. Flow regulated by Yellowtail Reservoir beginning Nov. 3, 1965. (Usable capacity, 1,356,000 acre-ft). Major regulation prior to November 1965 by 14 reservoirs in Wyoming and 1 in Montana with combined usable capacity of about 1,400,000 acre-ft (see Appendices C and D). Diversions for irrigation of about 465,000 acres above station.

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in Acre-feet	Adjusted Runoff in Acre-feet*
Oct. 1965	145,030	5,000	4,360	4,678	287,700	287,700
Nov.	37,772	4,360	618	1,259	74,920	214,200
Dec.	87,910	3,400	2,030	2,836	174,400	202,000
Jan. 1966	82,200	3,600	1,000	2,652	163,000	161,200
Feb.	51,600	3,600	550	1,843	102,300	158,200
March	28,150	1,500	500	908	55,830	159,500
April	31,900	2,330	619	1,063	63,270	120,800
May	40,435	1,980	956	1,304	80,200	154,800
June	31,500	1,200	840	1,050	62,480	133,200
July	29,483	1,550	745	951	58,480	77,300
August	28,826	1,490	781	930	57,180	75,800
Sept. 1966	30,256	1,510	840	1,009	60,010	115,700
Water year - 1965-1966	625,062	5,000	500	1,712	1,239,770	1,860,400

* Adjusted for change in contents in Yellowtail Reservoir.



Comparison of discharge during 1966 water year with 1965 water year and with average discharge for water years 1931-40, 1945-60, and 1948-62.

MONTHLY SUMMARY OF DISCHARGE
Tongue River at Miles City, Montana

Location.--Lat 46°21, long 105°48', in SE1/4 sec.23, T.7 N., R.47 E., on right bank 4 miles south of Miles City and 8 miles upstream from mouth.

Drainage area.--5,379 sq mi.

Records available.--April 1938 to April 1942, April 1946 to September 1966. Published as "near Miles City" April 1938 to April 1942. Not equivalent to records published as "near Miles City" May 1929 to October 1932. Monthly discharge only for some periods, published in WSP 1309. Records since January 1950 available in annual report of Yellowstone River Compact Commission.

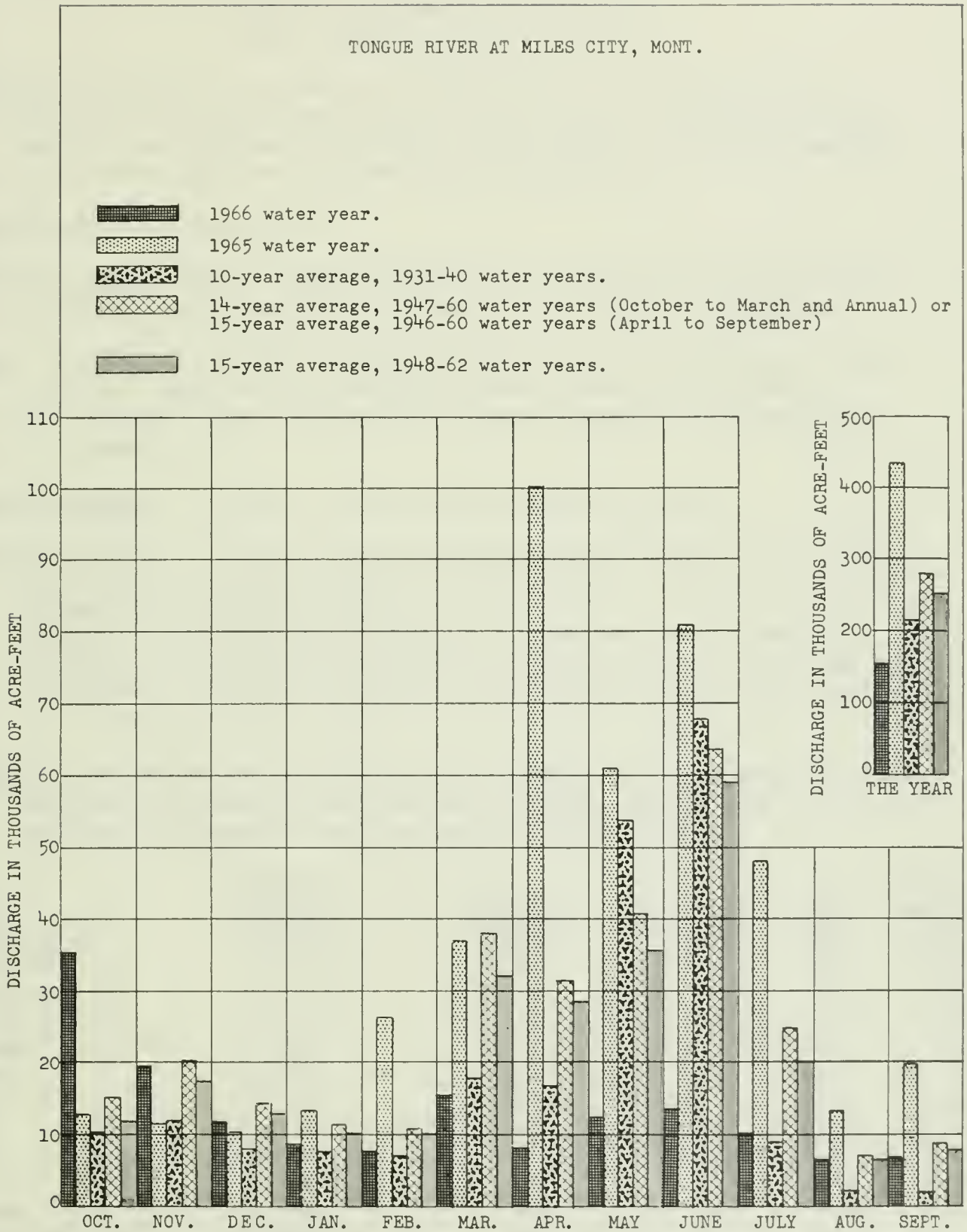
Gage.--Water-stage recorder. Altitude of gage is 2,370 ft (by barometer). April 1938 to April 1942, wire-weight gage at site 8 miles upstream at different datum. April 1946 to September 30, 1963, at datum 1.00 ft higher.

Average discharge.--23 years (1938-41, 1946-66), 370 cfs (267,900 acre-ft per year).

Extremes.--Maximum discharge during year, 1,110 cfs July 29 (gage height, 3.59 ft); maximum gage height, 5.00 ft March 15 (backwater from ice); minimum discharge recorded, 42 cfs July 8,9 (gage height, 0.99 ft), but may have been less during period of no gage height record Sept. 8-30. 1938-42, 1946-66: Maximum discharge, 13,300 cfs June 15, 1962 (gage height 12.33 ft, present datum), from rating curve extended above 3,200 cfs on basis of float measurement; maximum gage height, 13.27 ft (present datum) March 19, 1960 (ice jam); no flow July 9-19, Aug. 13,14, Sept. 28, 1940.

Remarks.--Records good except those for winter period, which are poor. Diversions for irrigation of about 90,000 acres above station. Flow regulated by Tongue River Reservoir (Appendix C) and many small reservoirs (combined capacity, about 15,000 acre-ft).

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in Acre-feet
October 1965	17,776	701	355	573	35,260
November	9,846	407	230	328	19,530
December	5,772	323	120	186	11,450
January 1966	4,415	170	125	142	8,760
February	3,930	170	110	140	7,800
March	7,801	500	120	252	15,470
April	4,146	189	51	138	8,220
May	6,278	372	65	203	12,450
June	6,836	625	55	228	13,560
July	5,093	978	45	164	10,100
August	3,223	160	60	104	6,390
September 1966	3,430	580	45	114	6,800
Water year 1965-1966	78,545	978	45	215	155,790



Comparison of discharge during 1966 water year with 1965 water year and with average discharge for water years 1931-40, 1947-60 and 1948-62.

MONTHLY SUMMARY OF DISCHARGE
Powder River near Locate, Montana

Location.--Lat 46°27', long 105°19', in SW1/4 sec.14, T.8 N., R.51 E., on left bank 1 1/2 mile downstream from bridge on U.S. Highway 12 at present site of Locate (5 miles west of former site of Locate), 1 1/2 miles upstream from Locate Creek, and 25 miles east of Miles City.

Drainage area.--13,189 sq mi.

Records available.--March 1938 to September 1966. Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

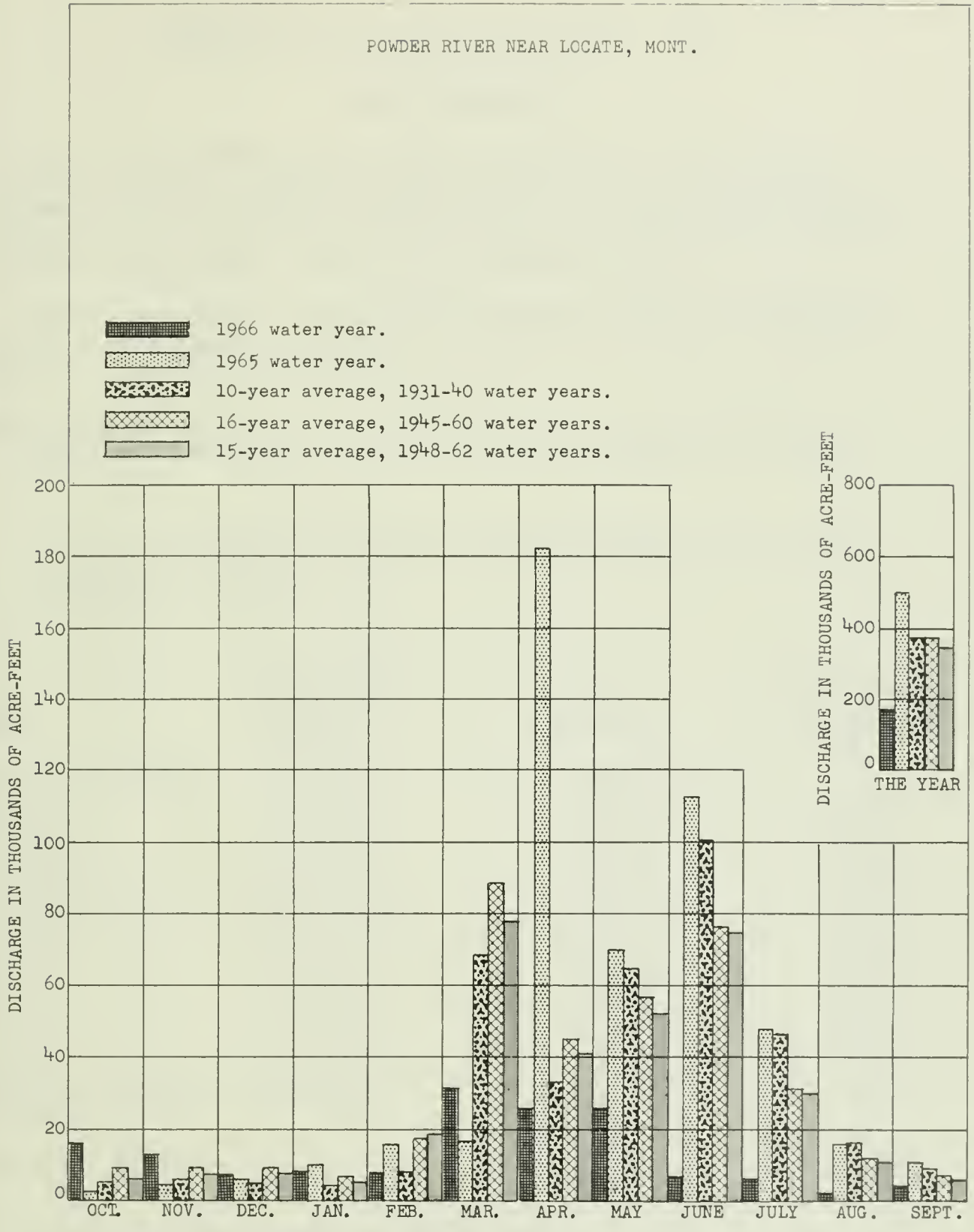
Gage.--Water-stage recorder. Altitude of gage is 2,390 ft (by barometer). Prior to July 11, 1947, wire-weight gage at bridge 1 1/2 miles upstream and July 11, 1947 to Sept. 30, 1965 water-stage recorder at sites near bridge of different datum.

Average discharge.--28 years, 585 cfs (423,500 acre-ft per year).

Extremes.--Maximum discharge during year, about 2,000 cfs Mar. 16 or 17, (gage height, about 8.25 ft, backwater from ice); minimum discharge observed 12 cfs Aug. 19 (gage height, 112 ft).
1938-66: Maximum discharge observed, 31,000 cfs Feb. 19, 1943 (gage height 11.23 ft, site and datum then in use), from rating curve extended above 17,000 cfs; no flow Jan. 16 to Feb. 12, Feb. 22-24, 1950, July 27, Sept. 21-27, Oct. 1, 1960, Sept. 4-8, 1961.

Remarks.--Records fair except those for winter periods, which are poor. Diversions for irrigation of about 52,000 acres above station. Some regulation by tributary reservoirs with combined usable capacity of 36,800 acre-ft.

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in Acre-feet
October 1965	8,167	335	227	263	16,200
November	6,602	280	60	220	13,090
December	3,855	165	90	124	7,650
January 1966	4,125	160	110	133	8,180
February	3,925	160	120	140	7,790
March	15,792	1,500	130	509	31,320
April	13,104	675	330	437	25,990
May	13,130	1,060	145	424	26,040
June	3,684	682	20	123	7,310
July	3,274	379	15	106	6,490
August	985	199	12	31.8	1,950
September 1966	2,087	346	15	69.6	4,140
Water year 1965-1966	78,730	1,500	12	216	156,150



Comparison of discharge for 1966 water year with 1965 water year and with average discharge for water years 1931-40, 1945-60 and 1948-62.

RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

BOYSEN RESERVOIR

Water-stage recorder at dam on Wind River, about 21 miles south of Thermopolis, Wyoming. Reservoir formed by earth-fill dam, construction of which began in 1947. Storage began October 11, 1951. Dead storage, 59,880 acre-feet at elevation 4, 657.0. Usable contents, 742,100 acre-feet at elevation 4,725.0 (top of gates). Crest of dam at elevation, 4,758.

Records given herein represent usable contents. Water is used for irrigation and power development. Allocation for flood control provided. Data furnished by U. S. Bureau of Reclamation.

Extremes.--Maximum usable contents during year, 728,300 acre-feet Oct. 4,5 (elevation, 4,724.29 ft); minimum, 504,600 acre-feet Mar. 9 (elevation 4,711.31).

1953-66: Maximum usable contents, 857,400 acre-feet, July 5, 1957 (elevation, 4,729.85 ft); minimum, 189,800 acre-ft March 18, 19, 1956 (elevation, 4,684.18 ft).

Month	Water-surface elevation in feet	*Contents in Acre-feet	Change in contents during month in acre-feet
September 30, 1965	4,724.25	727,500 1/	
October 31	4,722.98	703,300	-24,200
November 30	4,720.07	649,700	-53,600
December 31	4,716.20	582,500	-67,200
January 31, 1966	4,713.47	583,100	-44,400
February 28	4,711.83	512,500	-25,600
March 31	4,712.11	516,800	+4,300
April 30	4,712.47	522,400	+5,600
May 31	4,713.53	539,100	+16,700
June 30	4,714.70	557,800	+18,700
July 31	4,713.54	539,200	-18,600
August 31	4,712.15	517,400	-21,800
September 30, 1966	4,712.63	524,900	+7,500
Water year 1965-66			-202,600

*Does not include dead storage of 59,800 acre-feet.

1/Revised on basis of new capacity table, effective October 1, 1965.

RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

ANCHOR RESERVOIR

Water-stage recorder at dam on South Fork Owl Creek, 31 miles west of Thermopolis, Wyoming. Reservoir formed by thin concrete arch dam, construction of which began in 1957. Closure of dam made November 21, 1960. Temporary outlet at elevation 6,304.30 ft still in use. Lowest permanent outlet sill at elevation 6,343.75 ft, total contents, 148 acre-feet. Total contents, 17,420 acre-feet at upper active capacity level of 6,441 ft. Crest of dam at elevation 6,452.5 ft.

Records given in this report are total contents. Data furnished by U. S. Bureau of Reclamation.

Month	Water-surface elevation in feet	*Contents in Acre-feet	Change in contents during month in acre-feet
September 30, 1965	6,304.30	0	
October 31	6,304.30	0	0
November 30	6,304.30	0	0
December 31, 1965	6,304.30	0	0
January 31, 1966	6,304.30	0	0
February 28	6,304.30	0	0
March 31	6,304.30	0	0
April 30	6,304.30	0 1/	0
May 31	6,347.50	211	+211
June 30	6,330.00	30	-181
July 31	6,304.30	0	-30
August 31	6,304.30	0	0
September 30, 1966	6,304.30	0	0
Water year 1965-66			0

*Includes dead storage.

1/ Capacity table revised effective May 1, 1966.

RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

YELLOWTAIL RESERVOIR

Water-stage recorder at dam on Bighorn River, about 15 miles southwest of St. Xavier, Montana. Reservoir formed by concrete arch dam, construction of which began in 1961. Storage began November 3, 1965. Dead storage, 18,970 acre-feet at elevation 3,296.5 ft. Usable contents, 1,356,000 acre-feet at elevation 3,657.0 ft. Crest of dam at elevation 3,660.0 ft.

Records given herein represent usable contents. Water is used for irrigation, power development and recreation. Allocation for flood control provided. Data furnished by U. S. Bureau of Reclamation.

Extremes.--Maximum usable contents during period Nov. 3 to Sept. 30, 601,700 acre-feet September 30 (elevation, 3,573.10).

Month	Water-surface elevation in feet	*Contents in Acre-feet	Change in contents during month in acre-feet
September 30, 1965	---	0	
October 31	---	0	0
November 30	3,423.4	120,400	+120,400
December 31	3,438.2	148,000	+27,600
January 31, 1966	3,437.3	146,200	-1,800
February 28	3,462.8	202,100	+55,900
March 31	3,499.40	305,800	+103,700
April 30	3,516.10	363,300	+57,500
May 31	3,535.82	437,900	+74,600
June 30	3,552.90	508,600	+70,700
July 31	3,557.17	527,300	+18,700
August 31	3,561.31	546,000	+18,700
September 30, 1966	3,573.10	601,700	+55,700
Water year 1965-66			+601,700

*Does not include dead storage of 18,970 acre-feet.

RESERVOIRS IN EXISTENCE ON JANUARY 1, 1950

The extent, if any, of the use of reservoirs in this category which may be subject to Compact allocations was not determined. As a matter of hydrologic interest, the month-end contents in acre-feet of four reservoirs are given. The first three reservoirs are in the Bighorn River Basin in Wyoming and data on contents were furnished by the U. S. Bureau of Reclamation. Tongue River Reservoir in Montana is operated under the supervision of the Montana State Water Conservation Board, which agency furnished operating data.

Contents in Acre-feet

Month	a/ Bull Lake	Pilot Butte Reservoir	b/ Buffalo Bill Reservoir	c/ Tongue River Reservoir
September 30, 1965	135,000	17,200	384,400	38,000
October 31	122,100	11,100	362,800	25,700
November 30	119,100	11,500	357,200	d/ 25,500
December 31, 1965	115,900	11,500	344,300	26,700
January 31, 1966	107,200	12,900	332,100	33,700
February 28	99,700	17,900	317,900	34,300
March 31	96,300	21,100	310,700	43,400
April 30	85,000	30,200	286,200	49,600
May 31	97,500	24,400	332,500	61,300
June 30	115,900	27,800	430,900	54,900
July 31	110,800	10,500	391,500	36,500
August 31	78,700	6,800	323,600	18,200
September 30, 1966	72,500	7,000	280,600	10,200
Change in Contents during year	-62,500	-10,200	-103,800	-27,800

a/ Capacity table revised October 1, 1965. Total capacity on September 30, was 134,418 acre-feet according to old table, and 135,002 acre-feet according to revised table.

b/ Revised capacity table based on survey of 1959; contents prior to October 1960 based on survey of 1941.

c/ Contents based upon sedimentation surveys of October 1948.

d/ Contents estimated on basis of irregular readings of reservoir stage and discharge records above and below the reservoir.

OUD-TANG
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